SHARING PRACTICES ON COMPUTATIONAL THINKING EDUCATION

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ABSTRACT
The CoTEDI project contributes to the further development of a STEM attitude in education by means of computational thinking (CT) development, where the focus is on the implementation of to design educational programs to be used to reinforce, learn and teach CT. It encompasses a new approach to implementing CT in primar schools and child facility centres, including special educational needs, diversity and inclusion. This addresses the need for richer computational skills for all in fully digitized and increasingly AI-enriched societies in Europe (Niemelä, Pears, Dagiene, & Laanpere, 2022; Hamidi, Mirijamdotter, & Milrad, 2023). This requires citizens to take agency over a wide range of technologies rather than being reduced to mere consumers. Building the foundations for such agency already in early childhood requires conditions for CT development and education to be facilitated professionally by teachers and child attendants. Through CT, the project develops and incorporates methods, problem-solving techniques, and logical reasoning into age-appropriate playful activities and experiences to enable children to solve problems in different areas and within different domains by means of creativity and exploration (Batur & Brinda, 2022; Sultan, Axell, & Hallström, 2023). This offers excellent opportunities to provide developmental support and respond to children's abilities and specific learning needs.

CoTEDI brings together 16 universities and educational institutions from 6 different countries to create, test and share worked educational programmes (EP) that allows professionals in primary education, childcare and special primary education to adopt strategies to work with digital technologies with children in the age groups of 4 to 12 years. To address the educational needs and learning capabilities the project brings together teachers and childcare professionals with researchers from educational psychology, technology enhanced learning, computer science and game design. This ensures that the EP developed by the project partners are not only sound CT education, but professionally grounded into organisational and cultural educational

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practices for ensuring appropriate alignment to age-related learning needs, inclusiveness, as well as diversity of and within the cohorts that are present in schools.

The several participating primary schools and child centres have been fully involved from the start to inform and align the technologies and technical approaches used in the EPs to the practices, values and principles. Based on their support and developmental needs, the project is designed so that teachers and child supervisors are given the opportunity to meet the teaching and learning needs of young children as specifically as possible through the integration of CT development.

The starting point for all project partners is to collect and exchange existing practices, approaches and digital teaching resources for CT and to identify the teaching needs of educators and childcare workers. To this end, variations in applications of programming, both with the use of technology (plugged-in applications like programmable robotics, on-screen & online programming environments, video games, music producing, etc.), tangible interactions with zero-code-adaptable robotics and games, and so called unplugged applications that address CT without the use of digital technologies are collected and further developed (Fanchamps et al., 2024). In tight collaboration with practitioners, the technologies and solutions are extended into EPs, where each EP creates a pattern of resources & tools, rules, as well as specific learning and supportive tasks (Glahn & Gruber, 2020; Zapata-Caceres, Martin-Barroso, & Roman-Gonzalez, 2021), that can be adjusted by practitioners to meet specific educational needs and objectives. To facilitate inclusion and diversity, such EPs must allow for a broad continuum of computational thinking activities that allow for continuously increasing challenges, conceptual understanding, as well as child creativity and exploration.

Implementing the project will ensure that through the EPs, an optimized methodological and pedagogical approach the application and development of CT will be made more widely accessible in the form of open educational resources that are available and teachable from early project stages. Because the teaching and training materials are based on a widespread of ready-made technical solutions, teaching practices, and conceptual possibilities, factors of diversity and inclusion are considered as a rich starting point for the development process rather than its end. This will enable educational professionals to discuss, explore, and implement CT education in a differentiated and adaptive way. With this respect this contribution presents first results of the project and provides insights on the state of using digital technologies at pre- and primary school level.

Keywords: Computational thinking education, digital transformation, educational innovation, primary education

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